Supporting Student Explorations at the Intersection of GenAI and VR

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Introduction

There is a growing interest in using GenAI tools in classrooms [1]. However, there is a gap in their utilization. In this work, we focused on making GenAI tools accessible by showing students the capabilities and opportunities of these tools to address this gap and we supported them to develop similar tools to address the learning challenges they care most about.

Methods

In this work in progress, we developed: (a) A tool using LLMs to generate conversation, 3D objects, and 360 environments during interaction with an AI agent inside an immersive environment. (b) Conducted a series of co-design workshops called "VR as the face of GenAI" at Stanford Accelerator for Learning, teaching participants how to use this GenAI tool as a stepping stone to tackle the learning challenges they think matter to them.

(A) GenAI Immersive Tool

The goal of this GenAI Immersive tool was to provide state-of-the-art LLMs capabilities in the simplest manner to help participants with different technical background and understanding of LLMs become familiar with the development of this type of tool and enable them to create similar tools. We developed a immersive experience using the OpenAI GPT-4 model to interact with a virtual character in Unity environment. It is designed to allow participants to change all the components in the tool based on their ideas transiting from class environment to any environment, creating any objects related to the material, and changing the charastics of the virtual agents in the conversation, and so on. Additionally, we utilized stable diffusion to generate objects and change the environment of interactions based on the conversation with the agent, aiming to increase engagement with the environment (Figure A).

For example, participants can create a virtual character, such as a Zoology major student. During a conversation with the character, the immersive environment dynamically shifts to topics like Tanzanian wildlife, with elements such as elephants and natural features generated based on the discussion (Figure B). This process thereby enhances the learning experience by adding another dimension to the conversation, which was also discussed in the prior works [2].

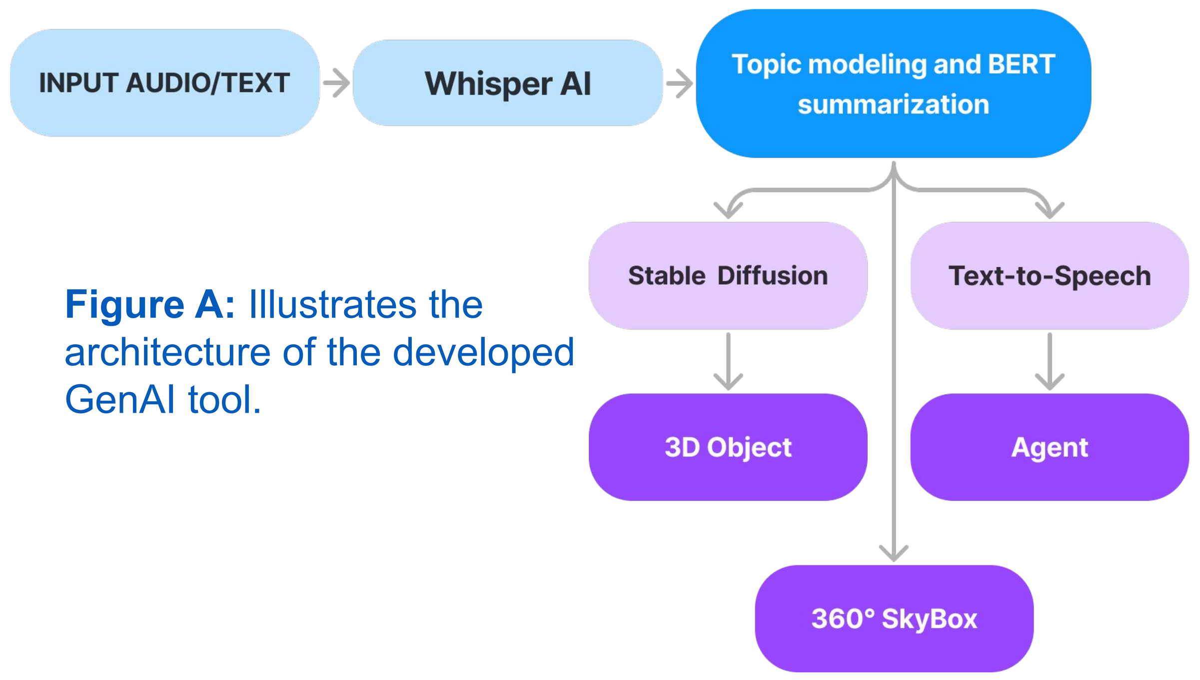

Figure A: Illustrates the architecture of the developed GenAI tool.

(B) Co-Design Workshops

In a series of workshops as part of the Stanford Accelerator for Learning's "Learning Design Challenge" (Figure C), a diverse group of participants from different disciplines participated to learn how they could design and develop GenAI tools to address the learning challenges they care about. These workshops were divided into series, focusing on: (a) developing their own project ideas with a focus on impact, (b) finding like-minded participants and building effective development teams, and practicing co-design with different stakeholders, (c) applying human-centered design and UX principles, (d) leveraging learning science, AI, VR, game design, and more in their designs, (e) prototyping digital environments/tools, and testing them with end users, and (f) developing and delivering a winning pitch.

In the first workshop, participants were introduced to the tool and learned how to install it on their computers. They also received guidance on where to start exploring the tool. Since all the components of the tool are designed like LEGO blocks, it was easy for them to experiment with different components. In the second workshop, they learned the principles of design for learning. The goal was to encourage them to think about their learning challenges and generate ideas to solve them using the provided tool, forming teams around these ideas. In the third workshop, they were introduced to the second part of the GenAI tool, which provided a deeper understanding of the tools and offered more opportunities to work on their projects. They had the chance to ask questions to mentors and discuss their initial ideas.

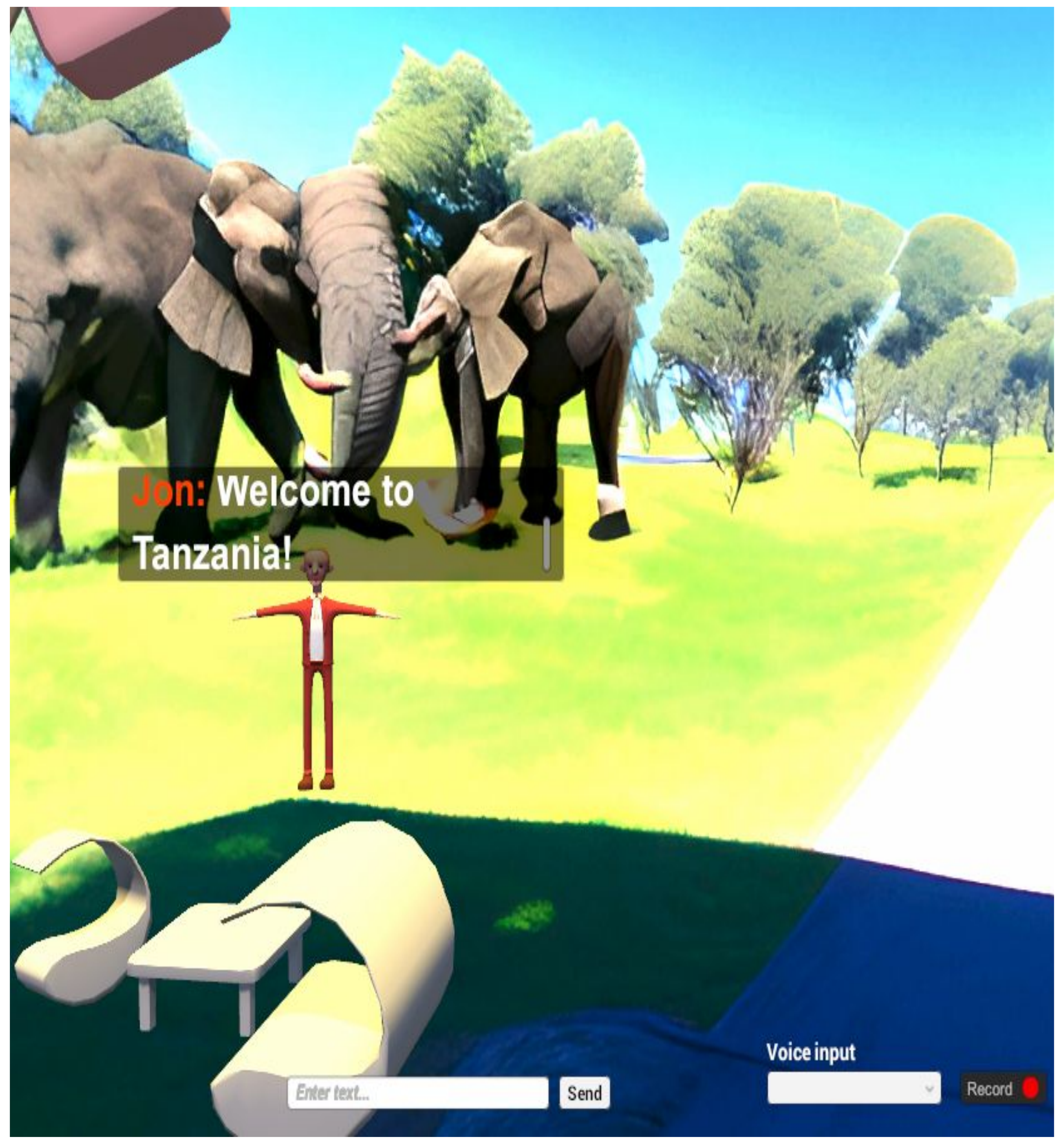

Figure B: A scene is set in the immersive environment generated by AI, where 'Jon,' defined as a Stanford student, presents his last journey to Tanzania. 'Jon' is an agent created by LLMs.

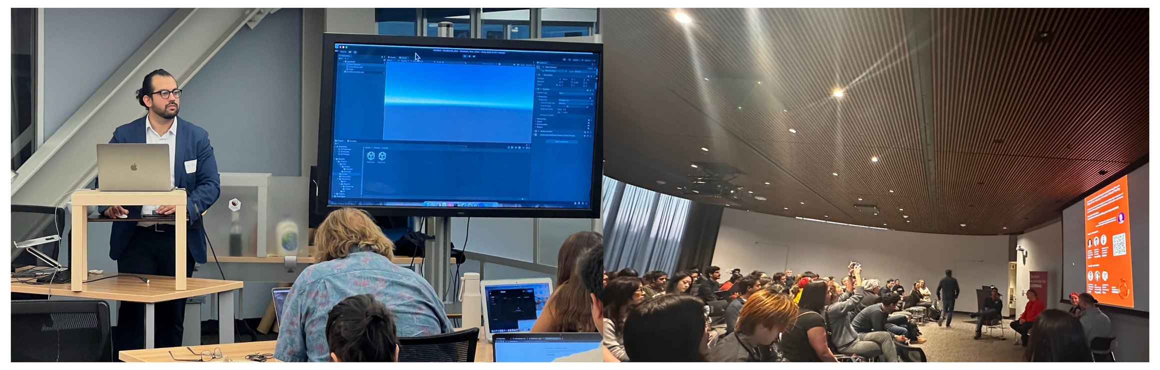

Figure C: VR as the face of GenAI workshop at Stanford Accelerator for Learning.

Conclusion and Future work

As a result of these workshops, five proposals received funding and mentorship for developing ideas like "Equality in Education," "Mindful Learning," and "Belongingness and Learning," each incorporating various uses of GenAI tools. In this work in progress, we address one aspect of AI literacy, which is the accessibility of GenAI tools. We have developed tools and conducted workshops to explore the impact of simplifying the process of bringing these tools to fruition and generating ideas around learning challenges. The next stage of this project will be: **(A) Gathering feedback through surveys and data-driven interviews with participants to assess the effectiveness of the proposed work in enhancing their understanding of GenAI tools and their applications. (B) Offering an open-source framework, tools, guidance, and materials for learners and educators to create similar procedures, while assessing its impact on broadening GenAI accessibility in K-12 setting.**

References

1. Celik, I. (2023). Exploring the determinants of artificial intelligence (Ai) literacy: Digital divide, computational thinking, cognitive absorption. Telematics and Informatics, 83, 102026.
2. Byun, J., & Joung, E. (2018). Digital game-based learning for K–12 mathematics education: A meta-analysis. School Science and Mathematics, 118(3-4), 113-126.

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